

a multiplier connected to said transform carrying out means, said multiplier multiplying a predetermined inverse transform window function and said inverse transformed signal to produce a product signal; wherein said transform carrying out means comprises:

a first processing device which receives said input signal  $y(m,k)$  and outputs a processed signal, said processed signal comprising a product signal formed by multiplying said input signal  $y(m,k)$  by a predetermined factor;

internal transform carrying out means connected to said first processing device for carrying out an inverse fast Fourier transform on said processed signal and for outputting as a result of said inverse fast Fourier transform an internal signal; and

a second processing device connected to said internal transform carrying out means to receive said internal signal and output as a result of processing said internal signal said inverse transformed signal.

30. (New) An apparatus for carrying out a forward transform comprising:

an input signal  $x(n)$ ;

a multiplier for multiplying a predetermined forward transform window function and said input signal  $x(n)$  to produce a product signal to produce a product signal  $xh(n)$ ;

transform carrying out means connected to said multiplier for carrying out a linear forward transform on said product signal  $xh(n)$  and for outputting a forward transformed signal  $y(m,k)$  representative of a result of said forward transform, said linear forward transform being defined by;

$$y(m,k) = \sum_{n=0}^{N-1} xh(n) \cos[2\pi(k+1/2)(n+n_0)/N]$$

where  $m$  represents a block number,  $n$  represents a sample number,  $N$  represents a block length and  $k$  is an integer between 0 and  $N-1$ ;

wherein said transform carrying out means comprises:

a first processing device which receives said product signal  $xh(n)$  and outputs a processed signal, said processed signal comprising a product signal formed by multiplying said product signal  $xh(n)$  by a predetermined factor;

internal transform carrying out means connected to said first processing device for carrying out a forward fast Fourier transform on said processed signal and for outputting as a result of said forward fast Fourier transform an internal signal; and

a second processing device connected to said internal transform carrying out means to receive said internal signal and output as a result of processing said internal signal said forward transformed signal.

31. (New) An apparatus for carrying out a forward transform comprising:

an input signal having a block size (N) of 512;

a multiplier for multiplying a predetermined forward transform window function and said input signal to produce a product signal; and

transform carrying out means connected to said multiplier for carrying out a linear forward transform on said product signal by calculating fewer than  $N^2$  multiplications and fewer than  $N(N-1)$  additions, and for outputting a forward transformed signal representative of a result of said linear forward transform;

wherein said transform carrying out means comprises:

a first processing device which receives said product signal and outputs a processed signal;

internal transform carrying out means connected to said first processing device for carrying out a forward fast Fourier transform on said processed signal and for outputting as a result of said forward fast Fourier transform an internal signal; and

a second processing device connected to said internal transform carrying out means to receive said internal signal and output as a result of processing said internal signal said forward transformed signal.

32. (New) An apparatus for carrying out a forward modified discrete cosine transform comprising:

an input signal;

a multiplier, said multiplier multiplying a predetermined forward transform window function and said input signal and outputting as a result a product signal; and

transform carrying out means connected to said multiplier for carrying out a linear forward modified discrete cosine transform on said product signal and for outputting a forward modified discrete cosine transformed signal representative of said linear forward modified discrete cosine transform, wherein said transform carrying out means comprises:

a first processing device connected to receive said product signal having N samples, N being an integer, from said multiplier, said first processing device outputting a processed signal having M samples, M being an integer different from N;

means connected to said first processing device for receiving said processed signal and for carrying out a forward fast Fourier transform on said processed signal, and for outputting an internal signal representative of said forward fast Fourier transform; and

a second processing device connected to receive said internal signal from said means for carrying out a forward fast Fourier transform, said second processing device processing said internal signal and outputting as a result said forward modified discrete cosine transformed signal.

33. (New) The apparatus as claimed in claim 32, wherein M is smaller than N.

34. (New) The apparatus as claimed in claim 32, wherein M is equal to N/2.

35. (New) An apparatus for carrying out an inverse modified discrete cosine transform comprising:

an input signal having M samples, M being an integer;

transform carrying out means carrying out a linear inverse modified discrete cosine transform on said input signal and for outputting an inverse modified discrete cosine transformed signal having M samples representative of said linear inverse modified discrete cosine transform; and

a multiplier connected to said transform carrying out means, said multiplier multiplying a predetermined inverse transform window function and said linear inverse modified discrete cosine transformed signal to produce a product signal having N samples, N being an integer different from M, wherein said transform carrying out means comprises:

a first processing device which receives said input signal, said first processing device outputting a processed signal;

internal transform carrying out means connected to said first processing device for carrying out an inverse fast Fourier transform on said processed signal as a result of processing said inverse fast Fourier transform an internal signal; and

a second processing device connected to said internal transform carrying out means to receive said internal signal and output as a result of processing said inverse modified discrete cosine transformed signal.

36. (New) The apparatus as claimed in claim 35, wherein M is smaller than N.

37. (New) The apparatus as claimed in claim 35, wherein M is equal to N/2.

38. (New) An apparatus for carrying out a forward transform comprising:

an input signal  $x(n)$ ;

a multiplier for multiplying a predetermined forward transform window function and said input signal  $x(n)$  to produce a product signal  $xh(n)$ ; and

transform carrying out means connected to said multiplier for carrying out a linear forward transform on said product signal  $xh(n)$  and for outputting a forward transformed signal  $y(m,k)$  representative of a result of said forward transform, said linear forward transform being defined by;

$$y(m,k) = \sum_{n=0}^{N-1} xh(n) \cos[2\pi(k+1/2)(n+n_0)/N]$$

where  $m$  represents a block number,  $n$  represents a sample number,  $N$  represents a block length and  $k$  is an integer between 0 and  $N-1$ ;

wherein said transform carrying out means comprises:

a first processing device which receives said product signal  $xh(n)$  having  $N$  samples and outputs a processed signal having  $M$  samples,  $M$  being an integer different from  $N$ , said processed signal comprising a product signal formed by multiplying said product signal  $xh(n)$  by a predetermined factor;

internal transform carrying out means connected to said first processing device for carrying out a forward fast Fourier transform on said processed signal and for outputting as a result of said forward fast Fourier transform an internal signal; and

a second processing device connected to said internal transform carrying out means to receive said internal signal and output as a result of processing said internal signal said forward transformed signal.

39. (New) The apparatus as claimed in claim 38, wherein  $M$  is smaller than  $N$ .

40. (New) The apparatus as claimed in claim 38, wherein M is equal to N/2.

41. (Pending) An apparatus for carrying out an inverse transform comprising:

an input signal  $y(m,k)$  having M samples, M being an integer;

transform carrying out means for carrying out a linear inverse transform on said input signal  $y(m,k)$  and for outputting an inverse transformed signal  $x_t(m,n)$  representative of a result of said linear inverse transform, said linear inverse transform being defined by:

$$x_t(m,n) = 2/N \sum_{k=0}^{N-1} y(m,k) \cos[2\pi(n+n_0)(k+1/2)/N]$$

where m represents a block number, n represents a sample number, N represents a block length and k is an integer between 0 and N-1;

a multiplier connected to said transform carrying out means, said multiplier multiplying a predetermined inverse transform window function and said inverse transformed signal  $x_t(m,n)$  to produce a product signal having N samples, N being an integer different from M;

wherein said transform carrying out means comprises:

a first processing device which receives said input signal  $y(m,k)$  and outputs a processed signal, said processed signal comprising a product signal formed by multiplying said input signal  $y(m,k)$  by a predetermined factor;

internal transform carrying out means connected to said first processing device for carrying out an inverse fast Fourier transform on said processed signal and for outputting as a result of said inverse fast Fourier transform an internal signal; and

a second processing device connected to said internal transform carrying out means to receive said internal signal and output as a result of processing said internal signal said

inverse transformed signal.

42. (New) The apparatus as claimed in claim 41, wherein M is smaller than N.

43. (New) The apparatus as claimed in claim 41, wherein M is equal to  $N/2$ .